

REMARKS

At the outset, Applicants appreciate the courtesies extended to Applicants' representatives during the interview of October 11, 2006 (the "Interview"). During the Interview, Applicants' representatives discussed the differences between the cited prior art and the above claim amendments. The Examiner stated that the claim amendments would be favorably received. In accordance with MPEP § 713.04, the substance of the interview is summarized more fully in the relevant sections below.

The Applicants gratefully acknowledge the Examiner's withdrawal of the rejection of claims 1-13 as being anticipated by Natan. Claims 49-88 are currently pending in this application. While the Examiner withdrew claims 49-68 from consideration based upon a restriction requirement in the last Action, the requirement is not well founded, particularly in light of the above amendments and following Remarks. Moreover, the non-elected claims are clearly allowable over the prior art for reasons similar to the elected claims. Accordingly, Applicants have amended elected and non-elected claims 49, 51-54, 58, 67-69, 79-82, 85, and 86 consistent with the proposed amendments and discussion at the Interview. In particular, and as discussed during the Interview, independent claims 49 and 69 have been amended to better clarify the invention and to more clearly distinguish over the cited prior art. Independent claim 69 has been amended to include two contacting steps, consistent with independent claim 49, whereby a nanoparticle layer is formed by "immersing the substrate in a solution containing the at least one nanoparticle species to form a nanoparticle layer" and a polymer layer is formed by "immersing the nanoparticle-layered substrate into a solution containing the at least one polymer species to form a polymer layer."

Additionally, claim 49 has been amended by deleting the term "crosslinker reagent" in favor of "polymer species." Thus, the first two steps of claims 49 and 69 are the same. Claim 49 includes the additional step of "removing the elastomeric film from the substrate to form" a free-standing elastomeric film. Claim 69 includes the steps of "contacting the surface of the nanocomposite film with a resin" and "treating the resin on the nanocomposite film to form an abrasion resistant matrix on the nanocomposite film." Dependent claim 70 then requires the resin-coated film to be removed from the substrate to produce a free-standing resin-coated film. Applicant respectfully submits that the amendments to these claims do not add new matter to the application and are fully supported by the specification. Support for the amendments may be

found at least in Figures 1 and 2 and at least in paragraph [0045] on page 9.

In view of the above amendments and the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending objections and allowance of the pending application.

Rejections Under 35 U.S.C. § 112, second paragraph

Claim 79 stands rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner alleges that there is insufficient antecedent basis for the limitation “said removing step” in line 1 of claim 79. Applicants have amended claim 79, by specifying that it depends from claim 70 instead of claim 69, to correct this obvious typographical error and provide clear antecedent basis.

This amendment is made for the sole purpose of clarifying claim 79. This amendment is not made for the purpose of avoiding prior art or narrowing the claimed invention, and no change in claim scope is intended. Therefore, Applicants do not intend to relinquish any subject matter by these amendments. Applicants respectfully submit that claim 79, as amended, fully complies with the requirements of 35 U.S.C. § 112, second paragraph.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 112, second paragraph rejection of claim 79.

Rejections Under 35 U.S.C. § 102

Claims 69-85, and 87-88 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U. S. Patent No. 6,592,945 issued to Suzuki ET AL., (“Suzuki ‘945”). Applicants respectfully traverse this rejection for at least the following reasons.

The Suzuki ‘945 reference is cited for disclosing a method for manufacturing a “laminate of multilayers of the polymer and the nanoparticles.” (Office Action at page 4.) As discussed during the Interview, Applicants’ claim amendments distinguish over Suzuki for several reasons. First, in Suzuki, the nanoparticles are deposited by sputter coating onto the substrate. (See Suzuki at column 4, lines 5-10.) The claimed invention, however, is directed to “immersing the substrate into a solution containing at least one nanoparticle species to form a nanoparticle layer” as now clearly recited in amended claim 69. During the Interview, Applicants’ representatives

demonstrated the difference between a film generated by sputter coating and a nanocomposite film fabricated by the claimed methodology. In particular, a film produced by sputter coating will sprawl and crack when deformed in stark contrast to the nanocomposite film fabricated by the claimed methodology where the integrity, structure, and function of the nanocomposite film is maintained under a deforming force. Secondly, in Suzuki, the nanoparticles are dispersed within the polymer layer in contrast to the claimed invention, which produces a nanocomposite film having alternating layers of nanoparticle layers and polymer layers.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 102(e) rejection of claims 69-85, and 87-88. Since, and as discussed in more detail below, none of the other prior art of record discloses or suggests all the features of the claim 69, Applicants respectfully submit that independent claim 69, and all the claims that depend therefrom are allowable.

Rejections Under 35 U.S.C. § 103

Claims 69-88 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,624,886 issued to Natan ET AL., (“Natan ‘886”), U. S. Patent No. 6,242,264 issued to Natan ET AL., (“Natan ‘264”) or U. S. Patent No. 6,025,202 issued to Natan (“Natan ‘202”) in view of U.S. published Patent Application 2004/02315997 issued to Meisenburg ET AL., (“Meisenburg”) or the Suzuki ‘945 reference. Applicants respectfully traverse this rejection for at least the following reasons.

The Natan references (i.e., Natan ‘886, Natan ‘264 and Natan ‘202) are cited for disclosing a method for making a film of gold nanoparticles “by forming a monolayer of Au nanoparticles on a glass substrate coated with APRMS or MPTMS; immersing the monolayer in a crosslinker, 2-mercaptoethylamine.” (Office Action at page 4.) As discussed during the Interview, these claims distinguish over the Natan references for several reasons. First, the Natan references disclose the use of monomers, such as 2-mercaptoethylamine. Nowhere do the Natan references disclose or suggest the use of polymers to form a polymer layer as now clearly recited in claim 69. Secondly, nowhere do the Natan references disclose or suggest forming an abrasion resistant layer as required in claim 69.

Moreover, the Natan references teach away from the claimed invention and the proposed combination does not produce a *prima facie* case of obviousness. The Examiner recognizes that

the Natan references do not disclose forming an abrasion resistant layer (Office Action at page 5), and attempts to rely upon the secondary references of Meisenburg and Suzuki to supply the missing claimed imitations relating to the abrasion resistant matrix. In the Natan references, substrates having a nanoparticle surface are used as sensors for surface-enhanced Raman spectroscopy (SERS) analysis of an analyte. Specifically, in the Natan references, a region of the substrate is coated with an analyte and a SERS spectrum of the analyte is acquired. Thus, forming an abrasion resistant coating on the nanoparticle layer would preclude the analyte from binding to the nanoparticle surface and all sensing capabilities of the nanoparticle-coated substrate would be destroyed.

Accordingly, the proposed combination would destroy the basic functional operability of the primary references. In these circumstances, it is clear that there can be no suggestion, teaching or motivation to combine the teachings of the Natan references with the teachings of the Miesenberg reference or the Suzuki '945 reference. (*See* MPEP § 2143.01(V) ("if the modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification") and MPEP § 2143.01(VI) ("if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teaching of the references are not sufficient to render the claims *prima facie* obvious."))

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 69-88. Since the none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features in independent claim 69, Applicants respectfully submit that claim 69, and all the claims that depend therefrom, are allowable.

Dependent Claims

The dependent claims recite a variety of features that are not disclosed or suggested in the prior art of record. For example, claim 70 requires the step "of removing the resin-coated nanocomposite film from the substrate to produce a free-standing resin-coated nanocomposite film." Nowhere do the Natan references nor the secondary references disclose or suggest producing a free-standing nanocomposite film as recited in dependent claim 70. Additionally, claim 82 defines the polymer species as "selected from the group consisting of one or more of poly(urethane), poly(etherurethane), poly(esterurethane), poly(urethane)-co- (siloxane), and

poly(dimethyl-co-methylhydrido-co-3-cyanopropyl, methyl) siloxane.” Nowhere do the Natan references nor the secondary references disclose or suggest these polymers.

Accordingly, Applicants respectfully submit that all the claims that depend from independent claim 69 are separately patentable over the prior art of record.

Restriction Requirement

In the Office Action, the Examiner alleged that “newly submitted claims 49-68 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 49-68 are directed to a method for producing a free-standing elastomeric nanocomposite film that was not in the originally presented claims.” (*Id.* at page 2.) The Applicants respectfully traverse this restriction requirement for at least the following reasons.

First, a method for producing a free standing elastomeric nanocomposite film was present in the originally filed claims. Applicants respectfully direct the Examiner to originally filed claim 5, which included a removing step to produce a free standing film. Specifically, original claim 5 recited the following:

The method of claim 1, further comprising the steps of:
contacting said nanocomposite film with an abrasion
resistant compliant resin;
curing said abrasion resistant compliant resin on said
nanocomposite film; and
removing said resinous coating from said substrate;
wherein said resin is selected from the group consisting of
thermosetting resins, photosetting resins, phenoformaldehyde,
phenol resins, epoxy resins, polysiloxane resins, and
poly(etherurethane) resins. (emphasis added)

Moreover, dependent claim 70 is also directed to removing the resin-coated nanocomposite film from the substrate to produce a free-standing resin-coated nanocomposite film. Finally, claim 69 has been amended such that the first two steps are the same as claim 49; therefore, examination of claim 49 would not impose any additional burden on the Examiner.

Most importantly, claim 49 distinguishes over the cited prior art for the reasons discussed during the Interview and presented in the relevant sections above. First, claim 49 distinguishes

over Suzuki for several reasons. As discussed above, in Suzuki, the nanoparticles are deposited by sputter coating onto the substrate. (*See* Suzuki at column 4, lines 5-10.) Claim 49, however, is directed to “immersing the substrate into a solution containing at least one nanoparticle species to form a nanoparticle layer.” Additionally, as discussed above, in Suzuki, the nanoparticles are dispersed within the polymer layer in contrast to the elastomeric film produced by the methodology of claim 49, which results in a nanocomposite film having alternating layers of nanoparticle layers and polymer layers.

Secondly, claim 49 distinguishes over the Natan references for at least the following reasons. As discussed above, nowhere do the Natan references disclose or suggest forming a polymer layer. Additionally, as discussed above, nowhere do the Natan references disclose or suggest producing a free-standing elastomeric nanocomposite film.

Therefore, in light of all these considerations and in view of the RCE filed concurrently herewith, Applicants respectfully request that the restriction for examination purposes be withdrawn and the Examiner kindly rejoin claims 49-68 for examination and allowance.

CONCLUSION

Applicants submit that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated objections and grounds for rejection have been overcome or rendered moot. Applicants have concurrently filed herewith, a Request for Continued Examination (RCE). Accordingly, Applicants respectfully submit that all pending claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is thus respectfully requested to pass the above application to issue.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution. Prompt and favorable consideration of this Reply is respectfully requested. Applicants respectfully request that a timely Notice of Allowance be issued for this application.

A Petition for a two (2)-month extension of time under 37 C.F.R. § 1.136(a) and accompanying fee in the amount of \$225.00 is filed herewith extending the period for responding to the outstanding office action. Applicants believe that no further extensions of time are required other than those in the accompanying Petition. If extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned for under 37 C.F.R. § 1.136(a). Any fees required for further extensions of time and any fees for the net addition of claims are hereby authorized to be charged to our Deposit Account No. 23-1951.

Respectfully submitted,



Richard S. Meyer
Reg. No. 32,541

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McGuireWoods LLP
1750 Tysons Boulevard
Suite 1800
McLean, VA 22102-4215
Tel: 703-712-5427
Fax: 703-712-5240
rmeier@mcguirewoods.com
4055333